2006 Survey of
Safety Belt Use in North Dakota

June 2006

Office of Traffic Safety
North Dakota Department of Transportation
608 East Boulevard Avenue
Bismarck, North Dakota 58505-0700

This report was prepared in cooperation with the
North Dakota Department of Transportation
Office of Traffic Safety
and
US Department of Transportation
National Highway Traffic Safety Administration
ND Highway Safety Project PHSP4020605-07-01

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Acknowledgements

DLN Consulting, Inc. expresses appreciation to several individuals who were essential to the completion of this project.

- Michelle Hurt of Hurtdidit Solutions assisted with the administrative procedures, coordinated the field observations and training.
- Lorrie Nantt supervised the coding which was conducted by Char Fettig, Lucy Kostelecky, Luella Nantt, Heidi Perry, and Zane Perry.
- Donna Morford supervised the data entry which was conducted by Char Fettig, Tyler Frank, Luella Nantt, Heidi Perry, Zane Perry, and Jennifer Russell.
- Tonya Kottre supervised and conducted the quality control which was also conducted by Donna Morford, Heidi Perry, and Jennifer Russell. Ms. Kottre also supervised the development of the spreadsheets, charts and tables.
- Heidi Perry developed all spreadsheets, charts, and tables.

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This study could not have been completed without the dedication and hard work of the people who conducted the field observations.

Richard Benz, Luella Nantt, Joan Johnson, Lucy Kostelecky, Ken Nelson, Eunice Frank, Don Kostelecky, Richard Medlar, Leon Rustand, Tyler Frank, Char Fettig, Spike Maderak, Pat Zastoupil, Josh Johnson, Naomi Thorson, Ida Harmon, and Donna Morford.

And finally, special thanks to the staff of the North Dakota Drivers License and Traffic Safety Division, and especially Carol Thurn, for her support throughout the project.

Deb Nelson

Keith Fernsler

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Executive Summary

This report documents the results of the annual survey of vehicle safety belt use in North Dakota, conducted for the eleventh time since the safety belt law went into effect July 14, 1994. The field data collection and the analysis were conducted by DLN Consulting, Inc. the first week of June 2006. The purpose of North Dakota's studies of safety belt use is to provide statistically reliable data from which generalizations, comparative analyses, and recommendations can be drawn. The North Dakota Department of Transportation (NDDOT) views this survey as a system to monitor the use rate and to determine safety belt use patterns within the state. The National Highway Traffic Safety Administration (NHTSA) funded the study through the NDDOT's Office of Traffic Safety (OTS).

The sampling methodology for this study was developed in 2001. The 2001 data was collected in July, whereas data was collected during late June in 2002 and mid-June in 2003. The 2004, 2005, and 2006 observations took place the first week in June. As of 2004, all analyzed data has been weighted. The 2004-2006 studies are statistically comparable, and the 2006 study is statistically comparable to those conducted prior to 2004 in that the estimation methodologies remained consistent. However, when any component of a survey changes, such as the data collection time frame or the analysis procedures, a new baseline is formed. This was the case in 2001 when the sampling methodology changed; in 2002 and 2003 when the data collection time frames changed; and in 2004 when, again, the data collection time frames changed, and all the data was analyzed using a weighting system across the board. Since the 2004 study, no methodology or details have been changed.

The 2006 survey was based on the random probability sample of North Dakota that was developed by NHTSA and approved for this study in 2001. Observations were made at the 319 sites pre-selected in 2001. All sites were surveyed over the same days of the week as in previous studies. Front seat drivers and outboard passengers in automobiles, vans, sport utility vehicles, and pickups were observed for safety belt usage.

The trends identified in previous statewide surveys conducted in the state remained consistent in 2006. Women were observed wearing their safety belts

more often than were males. Occupants in vans buckled up most often, and males in pickups were least likely to wear their safety belts. Occupants observed in the southeast region of the state were buckled up more than in any other region. The usage rate ranged from a high of 85.1% in Cass County to a low of 46.9% in Mountrail County. Rural vehicle occupants buckled up more than those in urban areas, and then most often on Interstate highways.

Observers tracked 20,850 vehicles and drivers in 16 counties at 319 intersections. There were 3,122 passengers in those vehicles. The data indicates that 78.4% of the drivers were wearing safety belts and 83.2% of passengers were wearing safety belts. For drivers and passengers combined, 79.0% were observed wearing their safety belts.

Introduction

DLN Consulting, Inc., located in Dickinson, ND was contracted by NDDOT to conduct a Field Survey by using a sampling methodology recommended by NHTSA and NDDOT, and following the requirements found in *The Federal Register, 23 CFR Part 1340,* published September 1, 1998. The methodology was designed to yield a statistically valid estimate of the current Safety Belt Use (SBU) rate in the State of North Dakota.

DLN Consulting, Inc. is incorporated in the State of North Dakota. The corporation has a solid and reputable background and understanding of traffic safety issues and evaluation techniques. Deb Nelson, owner and president of DLN Consulting, Inc., served as the project coordinator. Keith Fernsler, Ph.D., Sociology professor at Dickinson State University, provided the calculations and analysis for the 2006 study. Heidi Perry, consultant for DLN Consulting, developed the spreadsheets and assisted with creating the tables and charts. Field observers were hired and took part in extensive training and accuracy testing prior to conducting the field observations. DLN Consulting, Inc. staff completed the data coding, data entry and quality assurance testing.

Data entry was conducted in the *Microsoft Excel Professional 2003* program, then merged into the statistical program, *Statistical Program for the Social Sciences (SPSS) 14.0,* to run the data analysis.

Objective

The objective of this study is:

- To determine the Safety Belt Use (SBU) rate of drivers and front seat outboard passengers in the State of North Dakota.

Further broken down, the objective is to also determine the SBU rate for the following:

- Occupant (driver, passenger)
- Gender (males, females)
- Population (rural, urban)
- Roadway (interstate, federal highway, state highway)
- Type of Vehicle (automobile, van, sport utility vehicle, pickup)
- County (16 observed counties)
- Region of State (northwest, northeast, southwest, southeast)

The technical section of this report presents the description of the various tasks involved in conducting the SBU survey. General information about the methods and protocols used to conduct the SBU survey is found beginning on the next page.

A summary of the survey is presented below:

Table 1
Summary of the Safety Belt Use Survey

Methodology	Probability Based Sampling (stratified intersections within selected counties)
Source of Samples	2001 Methodology, approved by NDDOT and NHTSA.
Selected Counties	**Counties by Region:** *Northwest:* Bottineau, Mountrail, Ward, Williams *Northeast:* Grand Forks, Pembina, Ramsey, Wells *Southwest:* Burleigh, Mercer, Morton, Stark *Southeast:* Barnes, Cass, Nelson, Stutsman
Survey Period	June 5-9, 2006
Sample Size	20,850 vehicles
Observation Duration Per Site	Thirty (30) minutes
Number of Sites	319
Geographic Coverage	State of North Dakota Four regions of the state.

Methodology

History

From 1998 to 2000, the methodology for the observational safety belt survey in North Dakota was based on simple random sampling of intersections within selected counties. All controlled intersections, or roadway segments, in the selected counties in the State of North Dakota were eligible for sampling. The Drivers License and Traffic Safety Division (now the Office of Traffic Safety) of the North Dakota Department of Transportation selected both the counties and the intersections. The twelve counties in the original sample were Barnes, Burleigh, Cass, Dickey, Grand Forks, McHenry, McLean, Morton, Mountrail, Stark, Traill, and Williams. The number of sites chosen in each county ranged from a low of twelve sites in Traill County to a high of twenty-one sites in Stark and Williams Counties. The demographic character of the pre-selected sites was predominantly rural: 45% of the 220 sites were rural and 70% were either rural or in areas with a population base of less than 2,500 people.

The staff of DLN Consulting, Inc. reviewed this sampling methodology and concluded that the simple random sampling methods produced observations that were demographically representative of North Dakota's rural character, but were not representative of traffic patterns in North Dakota. With the sampling process in effect at the time, observations were made in areas where population and traffic were both low density. The staff concluded that the safety belt compliance rates produced by these sampling methods adequately reflected safety belt use in rural areas, but was not representative of safety belt use in areas where the number of vehicles and number of vehicle miles traveled might be greater, partly because of higher concentrations of people. For example, 63.6% of the sites in the 2000 survey were city or town streets (most in small towns) or county roadways; 36.3% of the sites were on interstate, federal, or state highways. Eventually, all of the sites in the 2001 reformulated sampling plan would be located on state-maintained state, federal, and interstate highways.

The 2001 Reformulation of the Sample

Given the concerns about the old sampling methods, the staff of DLN Consulting, Inc. set out to redesign the methodology, with approval from NDDOT. Each step in the process of formulating a new sampling plan was reviewed and approved with guidance from Dennis Utter and Donna Glassbrenner of the National Highway Traffic Safety Administration (NHTSA).

The First Stage Sample of Counties

The first major decision was to expand the number of counties from the federally required minimum of twelve to sixteen counties. The federal guidelines allowed for the inclusion of "certainty" counties ("certain" because they have a 100% probability of selection) that represent significant blocks of a state's population. Because the staff wanted to insure that all regions of North Dakota were observed, the focus was on Grand Forks in the Northeast quadrant, Cass in the Southeast, Burleigh in the Southwest, and Ward in the Northwest. According to the 2000 U.S. Census data, it was found that these four counties contained slightly more than 49% of North Dakota's 642,200 people. These four counties would be added to the rest of the sample later.

The next stage of the county sampling process focused on the selection of the additional twelve counties mandated by federal guidelines. Based on those guidelines, the universe of counties from which the sample would be drawn was limited to those counties that represented 85% of North Dakota's population. This step excluded 30 of the remaining 53 counties that collectively had less than 15% of the population. The sampling process now had four certainty counties and 23 counties in the universe from which twelve would be selected.

However, the staff reasoned that a county might be low in population but have a significant amount of traffic. NDDOT staff advised that a county with at least 70,000 daily vehicle miles traveled (VMTs) ought to be eligible for sample selection. This step added four counties with low levels of population but higher levels of vehicle miles traveled to bring the universe of eligible counties to 27.

Next, these 27 counties were classified into the four regions of the State. The result meant that the universe included seven counties in the northeast, nine in the

southeast, five in the southwest, and six counties in the northwest. The 27 counties had a population range from 2,753 people (Kidder County) to 123,138 (Cass County) and a range of daily vehicle miles traveled from 50,272 (Ransom County) to a high of 1,028,723 (Cass County).

Three counties were randomly selected from each quadrant of the State. The four certainty counties were added to produce a final sample of 16 counties. The counties in the final sample represented 73% of North Dakota's population and 64% of North Dakota's vehicle miles traveled in 2000.

The Second Stage Sample of Road Segments

Once the four certainty counties and remaining twelve counties were selected, the focus shifted to the intersections where the actual observations would take place. The staff of the NDDOT, Programming and Planning Division, Roadway Section, provided a database of all the state-maintained road segments in North Dakota. The database provided information on vehicle miles traveled, milepost indicators, mileage length for each segment, and the location of the segment on North Dakota DOT maps.

The first step was to stratify the road segments within each county in the sample based on the estimates of vehicle miles traveled. VMT averages for the road segments were used to stratify the road segments into those above and below the averages. A comparison of the use of the median and the mean for purposes of stratification showed that a division based on the mean average produced less variation within each stratum and greater differences between the strata. This procedure insured that both high and low VMT segments would be included in the sample and that the sample of road segments within each stratum would be selected with a probability proportional to average daily VMTs.

Once the road segments were stratified in each county, the sites could be selected. A target of 20 road segments per county was set in accordance with federal guidelines, a feasible target since the average number of road segments per county was greater than 60. A random number was assigned to each road segment within each stratum and, at this point, each segment in each stratum had an equal probability of selection for the final sample. The random numbers were used to

select 10 roadway segments within each stratum so that there would be a total of 20 roadway sites in each county and a grand total of 320 intersections for the 16 counties in the final sample.

The only glitch in this process involved Wells County, which had only enough road segments to allow for 19 sites. This meant that the final sample had 4 certainty counties, 12 additional counties randomly selected within each of the quadrants of the state, and 20 sites within each county (except for Wells), 10 from the lower stratum and 10 from the upper stratum of VMTs, for a total of 319 sites.

Locating the Roadway Segments

The next step was to locate the roadway segments on detailed, equal-scale maps for each county using the highway number, the beginning milepost indicator, and the ending milepost indicator for each roadway segment in the sample. Once located, intersections within the road segment were identified. If a single intersection was contained within the roadway segment, that intersection was chosen as an observation site, and this was the case for nearly all of the sites identified. In the rare instances where there was more than one intersection in a roadway segment, usually in the more urban areas, a quasi-random procedure was used. That is, the site was selected randomly so long as it fell within a cluster of sites in the county. This method minimized sampling error while maximizing efficiency by reducing the amount of travel time necessary for observers to move between intersections. In those instances where no intersection fell within the roadway segment, the observational site became the intersection as close as possible and as similar as possible to the roadway segment in the original sample.

Summary

NHTSA approved the sample of counties and road segments that resulted in the 2001 redesign of the sampling methodology. The sample has been unchanged since that time and has been used in the 2002, 2003, 2004, 2005, and 2006 safety belt surveys for North Dakota. The repeated use of this sample provides considerable comparability in the analysis of trends in the rate of safety belt compliance for North Dakota over the five-year period during which this sampling methodology has been in effect.

Protocols

Observers

Sixteen observers and one alternate were hired to conduct the safety belt survey. Twelve of the 17 people had observed in previous years and five were new observers. All observers were required to have a good driving record and provide proof of adequate insurance on the vehicle they were driving for the surveys. All observers were also required to wear safety belts.

Observational Protocols

The observational protocols were those employed every year since the 2001 survey, and were developed by DLN Consulting, Inc. What follows is a discussion of the methodological protocols for the observations.

- **The order of observation.** Within clusters, the order of observation was assigned with the use of a random numbering procedure. For sites outside the clusters, the order was determined by proximity to clustered sites.
- **Traffic direction.** In those cases where the roadway moved in only one direction, no real choice was involved. When a site was on a county line, the traffic direction was toward the county associated with the survey. In all other instances involving decisions, a randomization process was employed. Usually, this involved a random choice of one of two directions, north or south, or east or west.
- **Day of the week**. Observations were conducted Monday through Friday. Since most of the counties involve a significant number of square miles with considerable distance between sites, observers proceeded from one site to the next in the order already determined and listed in their directions.

- **Time of day.** A twelve-hour block of daylight, from 7:00 A.M. to 7:00 P.M., was identified for the parameters of the observational period. Each site observation occurred in half-hour time slots, beginning at the first five-minute interval after arrival at the site, and ending exactly thirty minutes later.
- **Traffic conditions and data collection problems.** Observers were trained to cope with traffic problems in the following manners:
    1. When traffic was heavy and there were too many vehicles to count visually, counting was done as long as possible and then stopped until the observer's count could catch up with observations. Some vehicles were, of necessity, skipped under these circumstances. When this occurred, counting resumed after no more than a one-minute pause. Once an observer's eyes were locked on a vehicle, a count of that vehicle had to be entered on the observation form.
    2. At sites with more than one lane of traffic in the predetermined direction, observations were made from the lane closest to the observer.
    3. Vehicles with darkened windows were ignored because visibility problems were likely to reduce accuracy.
    4. Field observers could terminate a pre-selected observation if any of the following circumstances arose: (1) Heavy rain or hail that would hinder the accuracy of the observations; (2) Traffic flow that was so heavy that it might have endangered the safety of the observer; (3) Crashes or road construction that rendered observations unfeasible, especially when a detour was involved. If a pre-selected site was to be terminated, the observer was to note the reason and mark the time of termination on the form. The observer was instructed to notify the supervisor as soon as possible if any of these situations were to occur.
- **Site accessibility problems.** If a pre-selected site was not available on the survey date and time, the observer made the following modifications:
    1. On mile-posted roads, observations were to be made at a location with a mile point that was one mile higher on the same roadway in the

same direction as the assigned traffic flow. If this point was not accessible, one more mile could be added. Increments up to three miles could be added with such changes noted on the observation forms.

2. On non-mile point streets and local roadways, the observer was to proceed in the same direction as the assigned traffic flow in one-quarter mile increments, not to exceed three-quarters of a mile, until an appropriate observation site was found and so noted on the observation form.
3. In cases of road construction where traffic was detoured, the observer was required to select a site on the detour as close to the original site as possible, no more than two miles away on mile-posted roadways and no more than one-half mile on non-mile point streets and local roadways. The change in site location and the reason for the change was noted on the observation form.

- **Observed Vehicles.** All passenger vehicles were observed and classified on the observation form as automobiles, vans, pickup trucks, and sport utility vehicles.
- **Observations.** Safety belt usage and gender characteristics were recorded for both drivers and passengers. The observations occurred from the observer's vehicle whenever possible, so the observer was parked as close as possible for accurate observation without compromising the observer's safety. If an observer could not observe from a vehicle, the observer was allowed to stand off the roadway at an intersection and required to wear a safety vest to insure safety.

Quality Assurance

Observers

The observer training session was held on June 2, 2006. Each observer was required to participate in the classroom instruction and in training observations. Each observer was tested for an inter-accuracy ratio through participation in a

minimum of four observation test sites. Test sites were selected to represent the types of sites and situations observers could expect to encounter in the field. None of the practice/test sites were actual sites in the sample of roadway segments. Observers worked in teams of two, observing the same vehicles, but recording data independently on separate observation forms. Teams were rotated throughout the training to ensure that each observer was paired at least three times with different partners. Each observer recorded type of vehicle, safety belt use, and gender during the tests. The average inter-accuracy ratio for all observers after testing was 96.2%.

Data Entry

Quality control standards were developed for the data entry. The following steps were taken by the data entry supervisor to ensure quality control:

- Each site packet was double-checked to determine the actual number of sheets was the same as that noted by the observers.
- Each observation sheet was double-checked to ensure the number of observations entered by the data entry operators equaled the number of observations.
- Any problems detected in the coding by the data entry operators were noted and brought to the attention of the project coordinator prior to the data cleaning. The coordinator made a determination as to the correct code.
- Each observation sheet was compared with the actual data entry for that sheet.
- Data entry accuracy was recorded at 99.83%. All errors discovered during quality assurance checks were corrected to achieve 100% accuracy.

Calculating the Weighted Data

The typical analysis of North Dakota safety belt usage data has taken the form of aggregate calculations of overall county and state-weighted estimates using a spreadsheet design that incorporates the mathematical formulas. These formulas produced estimates of safety belt use based on the formulas for estimating belt use in the different strata. One stratum represents sites where the daily vehicle miles traveled are above the mean for the county. A second stratum represents sites where the daily vehicle miles traveled is below the mean for the county.

The formula for estimating belt use for the sample sites is a follows:

$\frac{1}{\sum W_{ijk} VMT_{ijk}} \sum W_{ijk} VMT_{ijk} \left(B_{ijk} / O_{ijk} \right)$ = Belt Use in Stratum, adapted to each stratum.

Where the variables are:

- I = county
- j = stratum
- k = designated sample site
- W_{ijk} = the weight for the sample site in the stratum
    - *(Weight = Total sample sites in the stratum / number of sites sampled in the stratum)*
- VMT_{ijk} = Daily vehicle miles traveled for the individual sample site in the stratum
- B_{ijk} = Total number of belted drivers and passengers for the sample site in the stratum
- O_{ijk} = Total number of observed drivers and passengers for the sample site in the stratum

These estimates are then used to create the estimates using the following formula for the counties as follows:

$$\frac{VMT_{cs1}}{VMT_c} BeltUseStratum_1 + \frac{VMT_{cs2}}{VMT_c} BeltUseStratum_2$$

Where:

- VMT_{cs1} = Total daily vehicle miles traveled for the upper stratum in the county
- VMT_{cs2} = Total daily vehicle miles traveled for the lower stratum in the county
- VMT_c = Total daily vehicle miles traveled for the county

The county estimates are then used to calculate the overall estimate for the state as follows:

State Safety Belt Use = $\frac{\sum W_i V_i}{\sum W_i V_i P_i}$

Where:

- I = county
- Wi= county weight (number of available counties in the quadrant / number of counties sampled in the quadrant)
- Vi = total daily vehicle miles traveled for the county
- Pi = safety belt use in the county

These formulas were incorporated into a spreadsheet to generate estimates for each county and for the state as a whole.

Any additional analysis depended on unweighted data for all reports up to 2004. For example, only unweighted estimates could be used in discussions of the variation of safety belt usage rates for the different regions, roadway types, vehicle types, gender of drivers and passengers, and so forth. This imposed a significant limitation on inferences from the data analysis since the unweighted data did not take into consideration adjustments for vehicle miles traveled or the probabilities of sample selection for counties and sites in the study.

In 2004, the staff of DLN Consulting, Inc. worked with the NDDOT OTS to devise a method of weighting all of the data for analysis. The method involved the creation of a single weighting frequency for each observation. The steps involved in that process are as follows:

1. To produce an estimate for each county, the county's daily vehicle miles traveled was multiplied by the probability of each county's selection in the sample, or $W_c * VMT_c$. This produced an average, W_cVMT_c, for each county.
2. To produce an estimate for each site in the sample, the site's daily vehicle miles traveled was multiplied by the probability of the selection of each site for the sample (out of all the sites within a county), or $VMT_{ik} * W_{ik}$ for each site, where *I* is the county and *k* is the sample site within the county.
3. These two estimates were added together and divided by two to create an average of the two estimates.
4. In order to reduce the size of the average, each result for each county and site was divided by a constant, the mean of the average of the two estimates.

The frequency that resulted from these calculations is unique to the cases in each site. It was used in SPSS's data weighting procedure as the multiplier for each observation in the data set. The results approximate the results for the aggregate formulas and are reliable for the kinds of analysis typically done with the unweighted data.

As a final test, the percentages for a selected county were computed using both the traditional spreadsheet method of computation and the SPSS-based weighting procedure for the 2004 study. The results were virtually identical.

The unweighted overall frequencies and the weighted percentages were used to generate the tables and charts for this report. Specific frequencies in the tables were then calculated based on the weighted percentages.

Overall, this process generated weighted data throughout the analysis that approximates the same results that would have been found if it had been possible to extend the spreadsheet approach to additional variables. The significant advantage is that all of the data reflect adjustments for sample probability and vehicle miles traveled in calculating safety belt usage rates based on the mathematical formulas.

Confidence Intervals

To determine the validity of the sample of observations in the safety belt survey for 2006, ninety-five percent confidence intervals were calculated for drivers, passengers, and these two types of vehicle occupants together. The results are presented in the following table:

Table 2

Confidence Intervals for Safety Belt Utilization Survey North Dakota					
			95% Confidence Interval		
Occupants	**Frequency**	**Mean**	**Lower Boundary**	**Upper Boundary**	**Standard Error of Mean**
Drivers	20,850	1.26	1.25	1.27	0.003
Passengers	3,122	1.20	1.19	1.22	0.007
All	**23,972**	**1.25**	**1.24**	**1.26**	**0.004**

The means reported here reflect the range of variation from a value of one (belted) and two (not belted). The "95% Confidence Intervals" mean that, statistically, it can be assumed that there is a ninety-five percent probability that, given the mean for the 2006 sample of safety belt observations (1.25), the mean in the real world falls within the lower (1.24) and upper (1.26) boundaries for drivers and passengers combined.

For the 23,972 vehicle occupants observed in this 2006 safety belt usage survey, there are fewer than four chances out of a thousand that this study is invalid. This result is based on the computation of the “standard error of the mean” as the measure of sampling error. The standard error of the mean for drivers, passengers, and all vehicle occupants is reported in the table above.

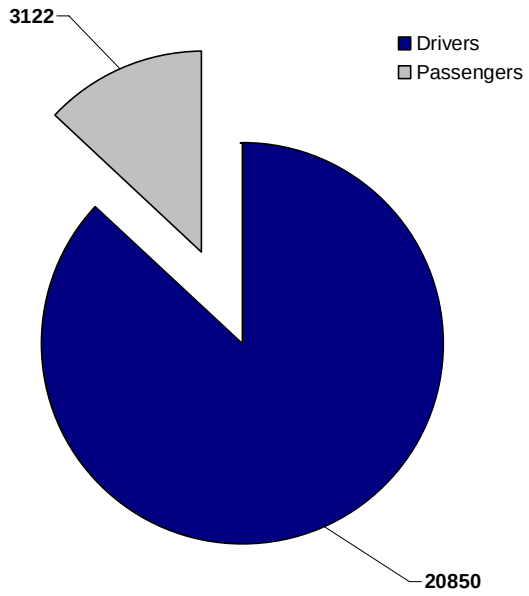
Results

History and Trends of Observations

The 2006 North Dakota survey of safety belt use is based on observations of 20,850 drivers and 3,122 passengers, for a total of 23,972 observations. This result is illustrated in the following chart:

Chart 1

Safety Belt Observations by Type of Vehicle Occupant

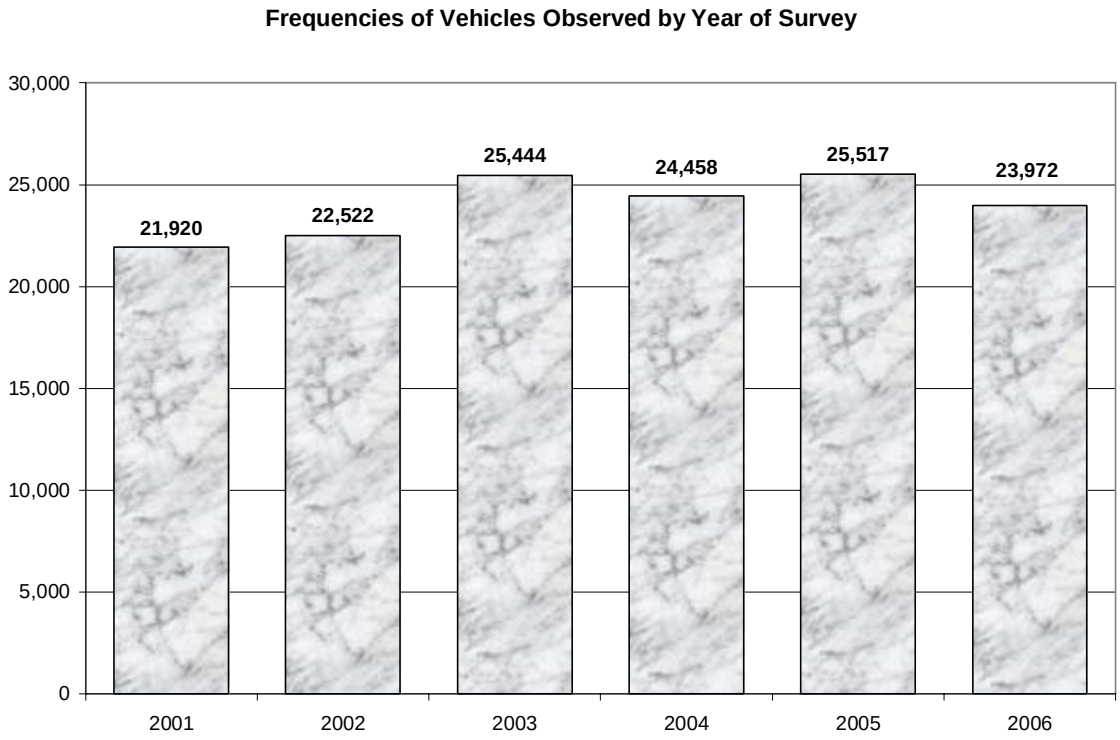


Drivers represent 87.0% of the total observations. Put another way, there were nearly seven (6.7) vehicles *without* passengers for every vehicle *with* an outboard passenger in the 2006 sample. The number of "driver only" vehicle observations has increased from the 2005 survey when it was found that there were 5.6 drivers for every passenger. The number of passengers has declined from 5,028 in 2004 to 4,538 in 2005 and 3,122 in 2006.

In general, the number of observations has been fairly consistent since a new sampling methodology was introduced in 2001. The average number of observations between 2001 and 2006 is 23,972, the same number of observations collected for the 2006 survey. The number of observations during this period ranged

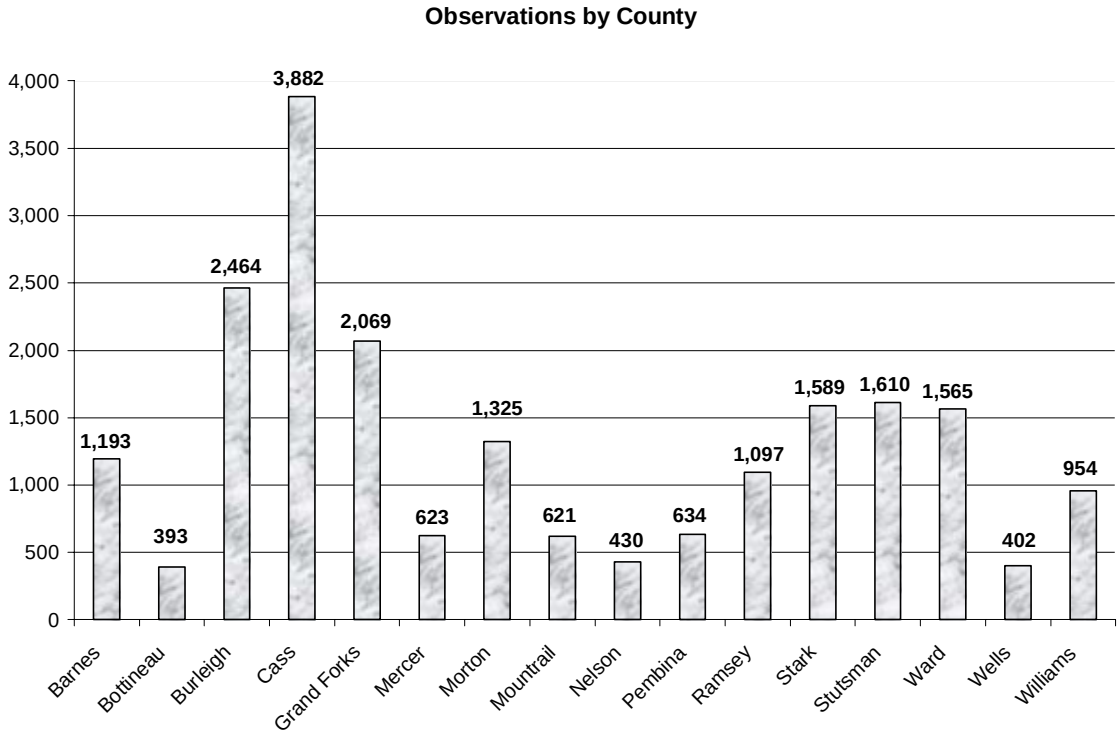
from a high of 25,517 in 2005 to a low of 21,920 in 2001. These results are illustrated in the following chart.

Chart 2



For 2006, the observations were completed for the same sixteen counties as in each of the survey years since 2001 when the sampling methodology changed. These counties include Barnes, Bottineau, Burleigh, Cass, Grand Forks, Mercer, Morton, Mountrail, Nelson, Pembina, Ramsey, Stark, Stutsman, Ward, Wells, and Williams counties. The frequencies of observations for each county are illustrated in the chart on the following page.

Chart 3



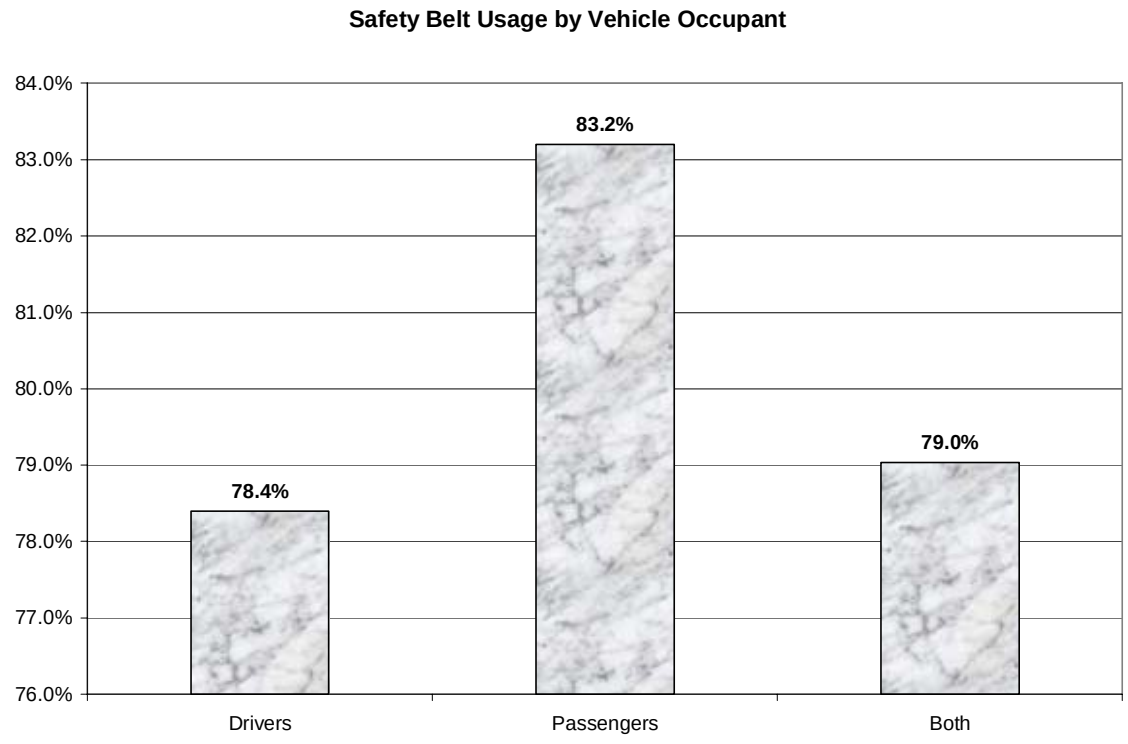
Four counties – Burleigh, Cass, Grand Forks, and Ward – account for 11,241 observations, or 46.9% of the total sample. On the other hand, six of the sixteen counties – Bottineau, Mercer, Mountrail, Nelson, Pembina, and Wells – account for a total of 3,668 observations, or 15.3% of the sample. These results reflect the major differences between the small number of large counties with dense vehicle traffic and the larger number of counties with low levels of population and fewer vehicle miles traveled. By far, the county with the most effect on the results of the safety belt survey in North Dakota is Cass County, which accounted for 4,476 observations, or, in other words, 18.7% of the total sample of observations in 2006. The significance of these numbers is that the safety belt compliance rates for North Dakota depend largely on the behavior of drivers and passengers in a relatively small number of counties with the largest numbers of drivers and passengers.

Safety Belt Survey Results: Vehicle Occupants

There were 20,850 observations of drivers and 3,122 observations of passengers for the 2006 safety belt survey in North Dakota. This observation data is weighted for sampling probabilities for sites and counties, and weighted for the vehicle miles traveled within sites and for all the sites in the sample counties. All of the safety belt use rates reported in this study are based on these weighted calculations.

For the 2006 survey, 78.4% of the drivers and 83.2% of the passengers were observed as belted. For drivers and passengers combined, 79.0% were observed as belted. These results are illustrated in the following chart.

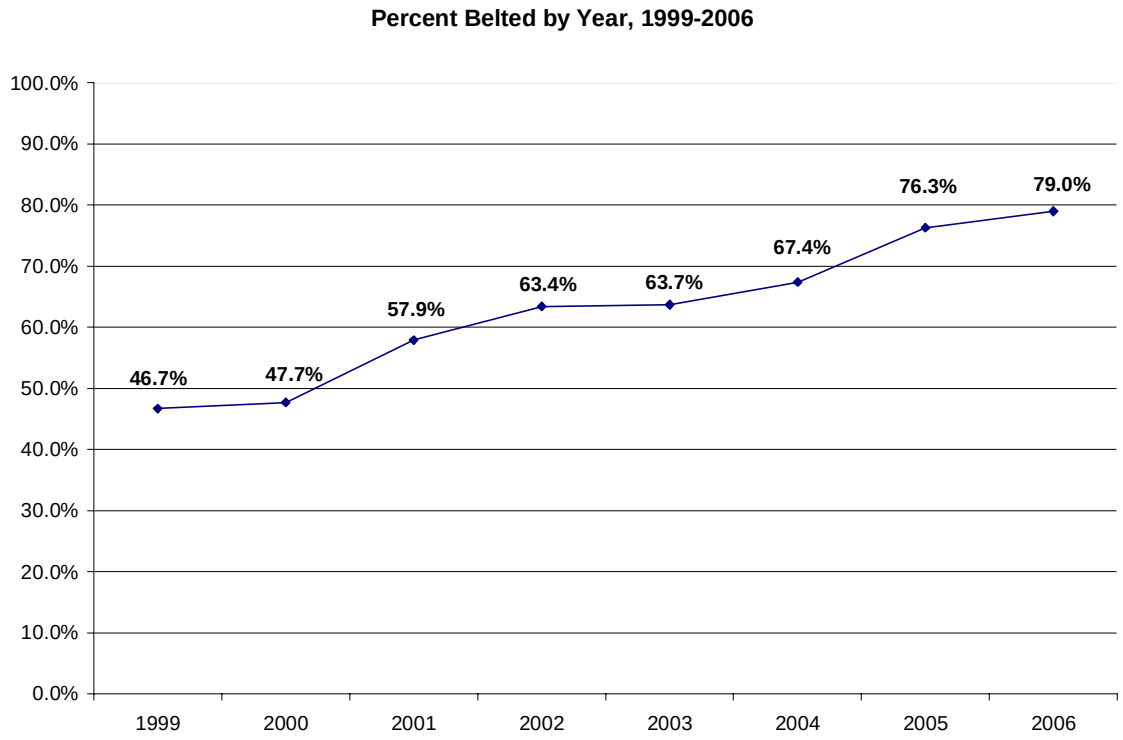
Chart 4



The total 2006 safety belt utilization rate of 79.0% represents an increase of 2.7 percentage points over the 2005 rate of 76.3%, and an increase of 11.6 percentage points over the 2004 rate of 67.4%. From 1999 to 2006, the average rate of increase in safety belt utilization has been 4.6 percentage points per year,

and over that much, 5.1 percentage points between 2003 and 2006. The total percent belted from 1999 to 2006 is illustrated in the following chart.

Chart 5



Results by Region of North Dakota

The sample counties in the Southeast region of the state had the highest safety belt utilization rate at 83.5% for all observed vehicle occupants. The Southwest region had the next highest rate at 76.2%, followed by the Northeast at 72.5% and the Northwest at 70.5%. These total results, and the results for drivers and passengers, separately, are presented in the table on the following page.

Table 3

Percent Belted by Region and Type of Vehicle Occupant 2006			
Region	**Drivers**	**Passengers**	**All Occupants**
Northwest	69.2%	75.4%	70.5%
Northeast	71.9%	77.4%	72.5%
Southwest	75.6%	85.0%	76.2%
Southeast	83.1%	86.2%	83.5%
Total	**78.4%**	**83.2%**	**79.0%**

Compared to the 2005 rates, there were increases in safety belt usage in all four of the regional quadrants. However, the increases were particularly significant for the northern regions. In the Northeast, safety belt utilization increased from 60.6% in 2005 to 72.5% in 2006, a change of 11.9 percentage points. The Northwest region typically has the lowest rate of safety belt use, and this was true in 2006. However, the safety belt usage rate in the Northwest increased from 55.2% in 2005 to a rate of 70.5% in 2006, a change of 15.3 percentage points. These results are illustrated in the following table.

Table 4

Percent of Vehicle Occupants Belted by Region and Year, 2005 -2006			
Region	**2005**	**2006**	**Percent Point Change 2005- 2006**
Northwest	55.2%	70.5%	15.3
Northeast	60.6%	72.5%	11.9
Southwest	74.3%	76.2%	1.9
Southeast	82.0%	83.5%	1.5
Total	**76.3%**	**79.0%**	**2.7**

Safety Belt Utilization by County

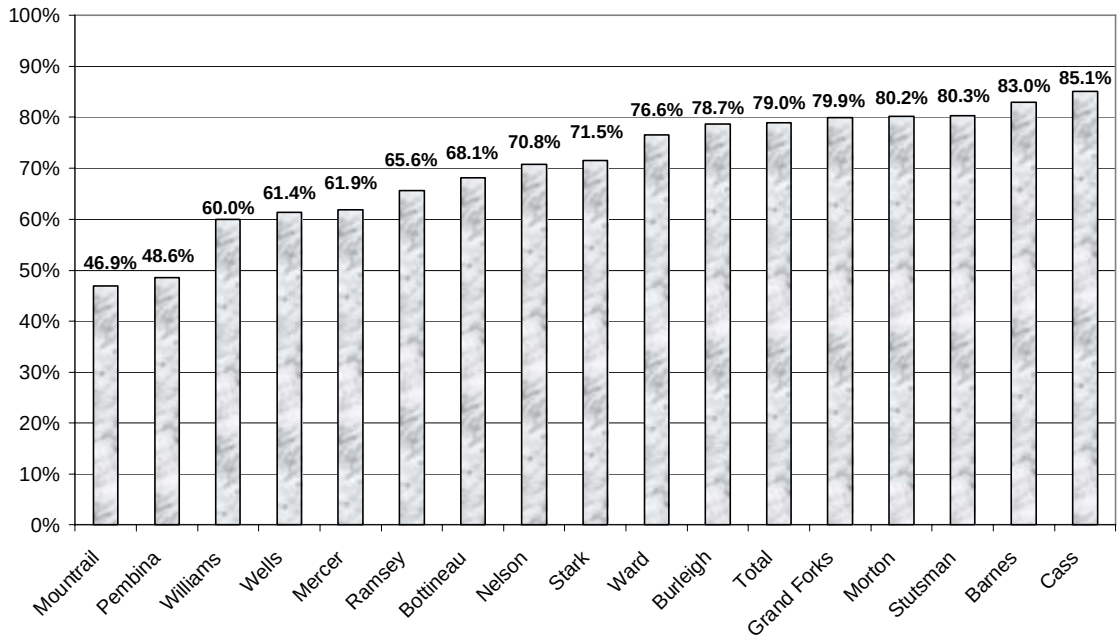
Safety belt utilization rates for 2006 for each of the sixteen counties in the North Dakota sample are presented in the following table and chart.

Table 5

Percent Belted by County and Vehicle Occupant			
	Observations		
County	**Drivers**	**Passengers**	**All Occupants**
Barnes	82.5%	85.5%	83.0%
Bottineau	66.2%	76.5%	68.1%
Burleigh	76.4%	86.9%	78.7%
Cass	84.8%	87.1%	85.1%
Grand Forks	78.8%	92.5%	79.9%
Mercer	60.7%	77.8%	61.9%
Morton	79.8%	89.4%	80.2%
Mountrail	45.3%	56.3%	46.9%
Nelson	68.8%	78.1%	70.8%
Pembina	47.6%	54.1%	48.6%
Ramsey	62.3%	76.2%	65.6%
Stark	69.7%	82.7%	71.5%
Stutsman	79.4%	85.4%	80.3%
Ward	76.2%	77.6%	76.6%
Wells	60.3%	68.2%	61.4%
Williams	58.5%	71.4%	60.0%
Total	**78.4%**	**83.2%**	**79.0%**

Chart 6

Percent Belted by County



The sixteen counties have a range from a low of 46.9% in Mountrail County to a high of 85.1% in Cass County, a difference of 38.2 percentage points in total safety belt use. Five of the sixteen counties – Barnes, Cass, Grand Forks, Morton, and Stutsman Counties – all have utilization rates above the statewide average of 79.0%.

In the 2005 report, it was noted that Grand Forks had a rate of 60.6%, which was important to the overall state rate because Grand Forks contributed 18.0% of the statewide observations. In 2006, Grand Forks contributed a more balanced 9.1% of the total observations. Of more importance is the fact that the Grand Forks rate increased from 60.6% in 2005 to 79.9% in 2006, a change of 19.3 percentage points. On the other hand, the overall safety belt usage rate of 85.1% for Cass County was particularly important to the statewide rate because Cass County represented 18.7% of the total observations for 2006. The counties with the lowest rates of safety belt usage – Mercer, Mountrail, and Pembina –together contribute

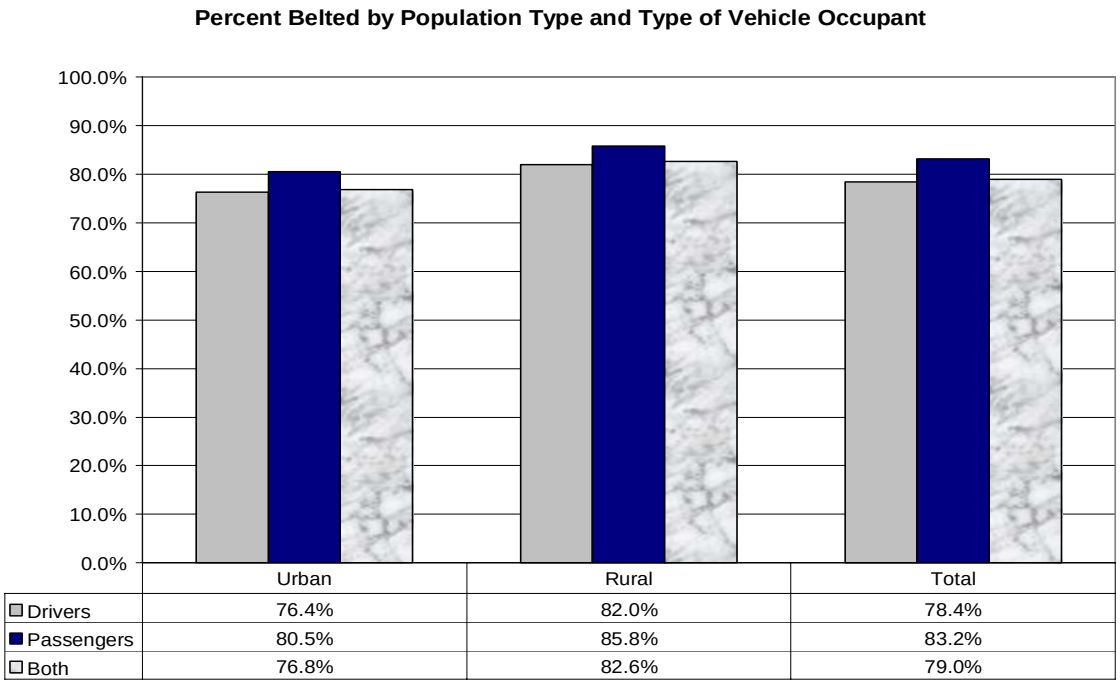
9.1% of the total observations for 2006, the same as Grand Forks County and less than half of the observations in Cass County.

A statistical note is in order here. Statistical inferences for the counties, especially the counties with relatively smaller numbers of observations, become statistically unreliable because the total frequency may have high sampling error rates.

Safety Belt Usage Rates by Population (Urban and Rural Areas)

Safety belt surveys in North Dakota have typically resulted in higher rates of use in areas designated as rural in comparison to urban areas. This is also true for the 2006 survey. Rural drivers were belted at a rate of 82.0% in comparison to 76.4% for urban drivers. Rural passengers were belted at a rate of 85.8% compared to 80.5% for urban drivers. For all vehicle occupants, the rate was 82.6% in rural areas and 76.8% in urban areas. The rates for both rural and urban vehicle occupants increased from the 2005 rates. The 2006 results are illustrated in the following chart.

Chart 7

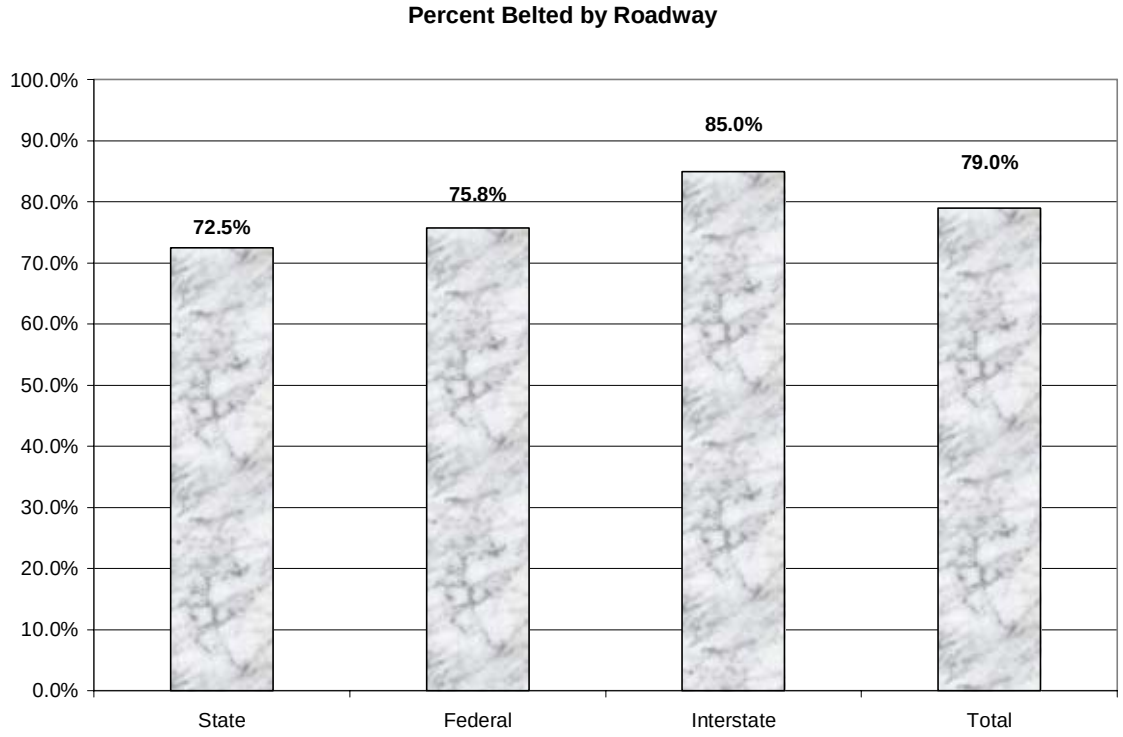


	Urban	Rural	Total
Drivers	76.4%	82.0%	78.4%
Passengers	80.5%	85.8%	83.2%
Both	76.8%	82.6%	79.0%

Safety Belt Usage Rates by Roadway

A typical result for North Dakota Safety Belt surveys is to find the highest rates of safety belt use on interstate roadways, followed by federal roadways, with the lowest rates on state-maintained roadways. The results for the 2006 statewide survey are consistent with the past trends, as illustrated in the following chart.

Chart 8



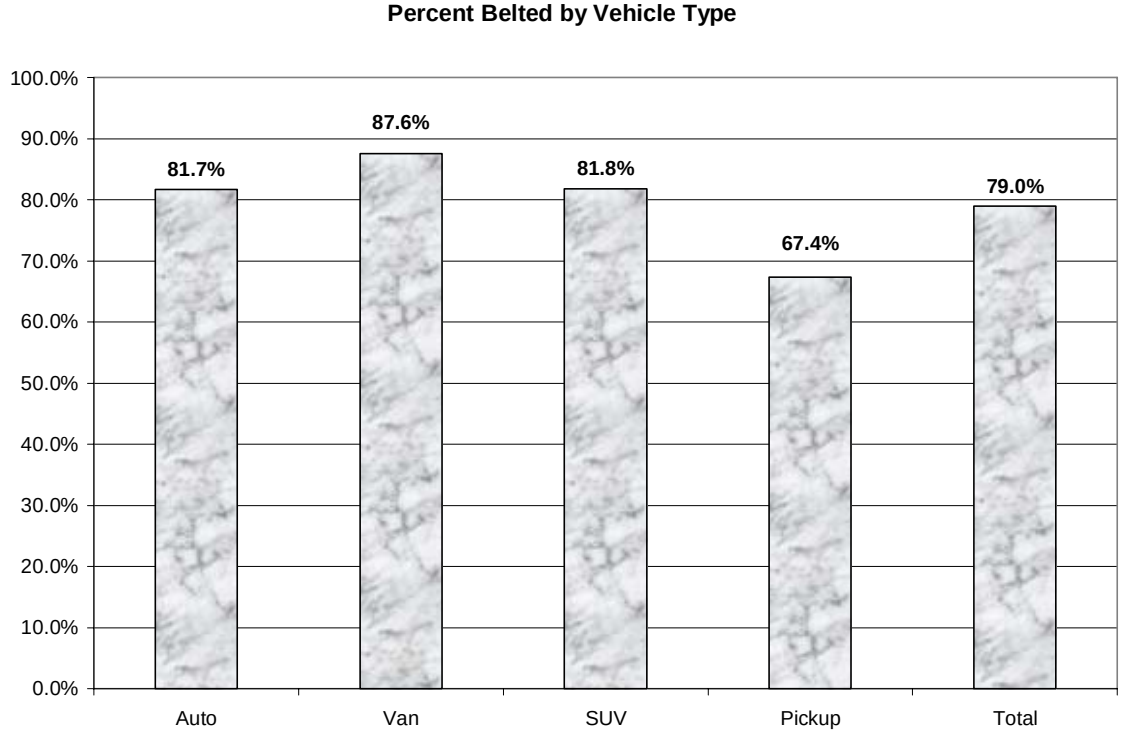
The chart shows that 85.0 % of interstate vehicle occupants were belted in comparison to 75.8% on federal roads and 72.5% on state roadways. The three types of roadways each represent about one-third of the vehicle occupant observations: 30.7% on state highways, 35.5% on federal roadways, and 33.8% on interstate roadways. Therefore, it is not likely that the proportions of occupants on the different types of roadways skew the data significantly.

Safety Belt Usage by Vehicle Type

Safety belt use is highest for occupants of vans (87.6%) and SUVs (81.8%) in the 2006 survey, although occupants of automobiles are not far behind, with an

overall rate of 81.7%. Occupants of pickup trucks were observed as belted at a rate of 67.4%, a rate that is 20.2 percentage points lower than the rate for vans and about 14 percentage points lower than the rates for SUVs and automobiles. The data are illustrated in the following chart and table.

Chart 9



Although pickup truck vehicle occupants have significantly lower rates of safety belt usage, the 2006 rate of 67.4% represents a 5.4 percentage point increase over the 2005 rate of 61.6%. Improvement in the rate of safety belt use for pickups is important to the statewide data because pickup trucks represent one-fourth of the total observed vehicles in North Dakota surveys (25.6% of vehicle occupants in the 2006 survey). By contrast, the occupants of vans and SUVs combined represent 27.6% of the total sample in 2006. Occupants of automobiles account for nearly half of the observations at 46.8% in the 2006 survey. Safety belt usage rates in North Dakota depend heavily on the behavior of occupants of automobiles and pickup trucks, which together account for nearly three out of every four vehicle occupants (72.4%). This data can be further viewed in the table below.

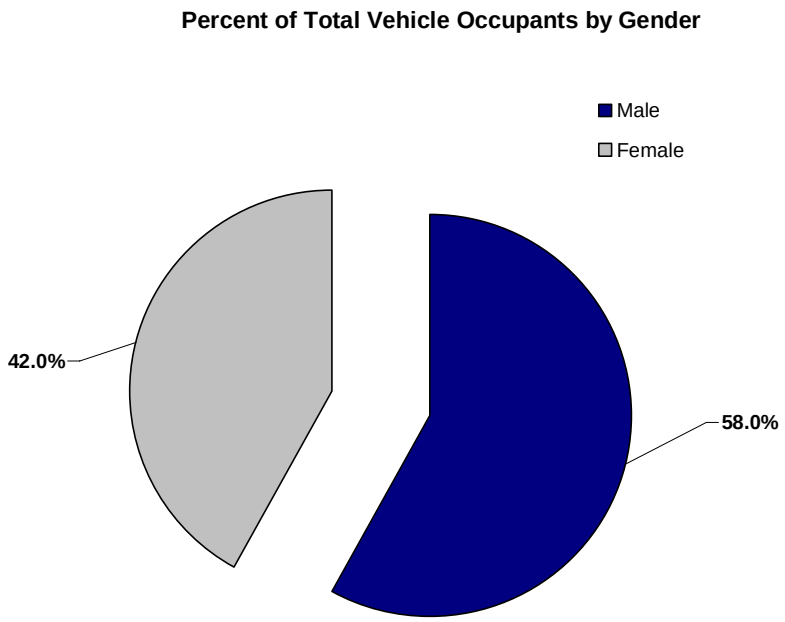
Table 6

Observations by Vehicle Type and Type of Vehicle Occupant				
Vehicle	**Drivers**	**Passengers**	**Both**	**Percent of sample**
Auto	9,751	1,463	11,214	46.8%
Van	2,228	450	2,678	11.2%
SUV	3,413	525	3,938	16.4%
Pickup	5,458	684	6,142	25.6%
Total	**20,850**	**3,122**	**23,972**	**100.0%**

Gender and Safety Belt Usage for 2006

Typically, males represent the largest proportion of vehicle occupants. This is true for the 2006 survey, which is illustrated in the following chart.

Chart 10

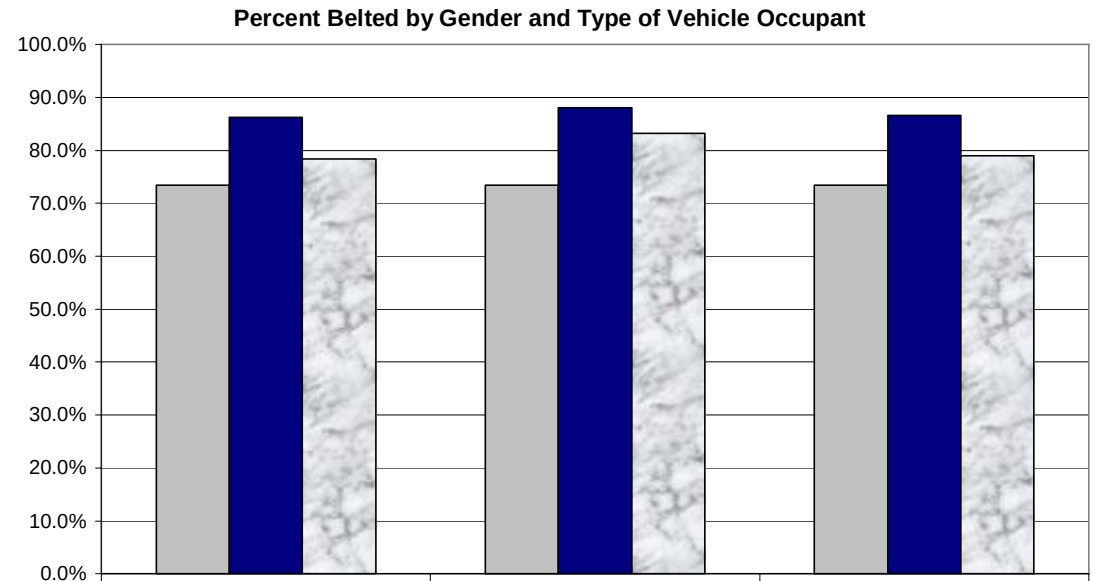


The percentages in the above chart, 58.0% males and 42.0% females, are nearly identical to the proportions in the 2005 survey, which were 58.3% male and 41.7% female.

Males are much more likely to be the drivers of vehicles; 61.4% of the drivers are male in 2006. On the other hand, nearly one-third of the passengers, or 65.2%, are female in the 2006 survey.

The safety belt use rates are very consistent for males and females, regardless of whether they are drivers or passengers. This can be seen in the chart on the following page.

Chart 11



	Drivers	Passengers	Both
Male	73.4%	73.5%	73.4%
Female	86.3%	88.1%	86.6%
Both	78.4%	83.2%	79.0%

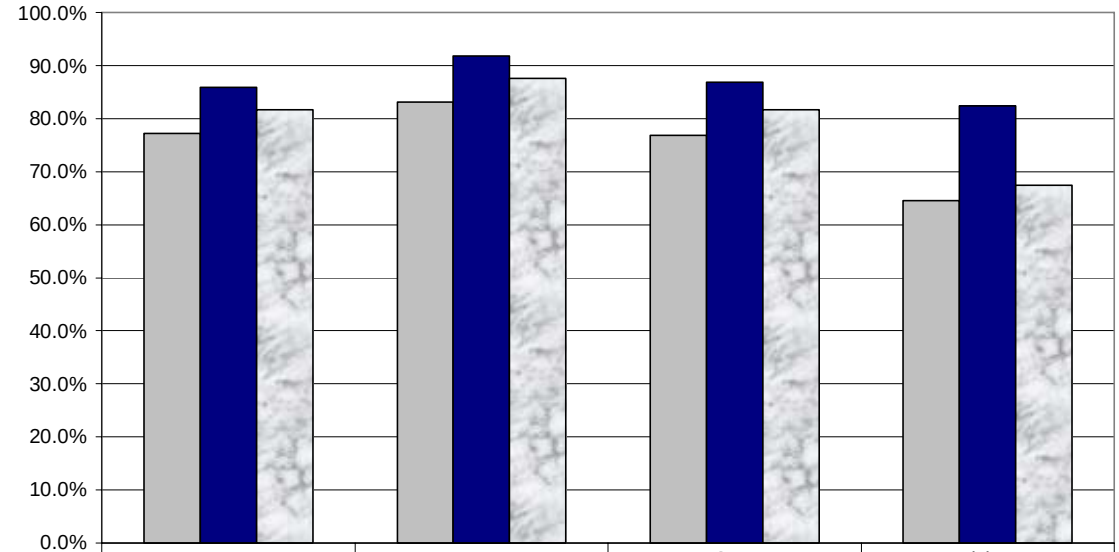
For example, the rates for males are 73.4% as drivers and 73.5% as passengers, for a total rate of 73.4%. Similarly, the rate for female drivers is 86.3% and the rate for female passengers is 88.1%, for an overall rate of 86.6% for females. Overall, the rate of safety belt usage for females is 13.2 percentage points higher than the rate for males.

Safety Belt Use by Gender and Vehicle Type

Females, whether they are drivers or passengers, have higher rates of safety belt use in every type of vehicle. This generalization from the 2006 North Dakota survey is illustrated in the table and chart that follows.

Chart 12

Percent Belted by Gender and Vehicle Type



	Auto	Van	SUV	Pickup
Male	77.2%	83.1%	76.9%	64.6%
Female	85.9%	91.8%	86.9%	82.4%
All	81.7%	87.6%	81.7%	67.4%

The "gender effect" is consistent for all of the types of vehicles. For example, the female safety belt use rate is 8.7 percentage points higher than the male rate for automobiles and vans, and 10.0 percentage points higher for SUVs. Pickup trucks are somewhat different matter.

During the history of safety belt surveys in North Dakota, and across the nation, male safety belt use is low for pickup trucks in comparison to other vehicles. This is true for the North Dakota 2006 survey, with a male safety belt use rate of 64.6%. This rate, however, does represent an increase of 5.8 percentage points over the comparable rate for males, 58.8%, in the 2005 survey.

For female drivers and passengers, combined, in the 2006 survey, the safety belt use rate is 82.4%, which is 17.8 percentage points higher than the 64.6% rate

for males in pickup trucks. In addition, the 2006 rate for females represents an increase of 8.5 percentage points over the 2005 female pickup truck rate of 73.9%.

It is worth noting that females are especially likely to wear their seat belts in vans, with 91.8% buckled in the 2006 survey. However, males also are the most likely to wear their safety belts in vans, with a rate of 83.1%, in comparison to safety belt use in other vehicles.

In other words, female safety belt use is high, in comparison to the rates for males, for all kinds of vehicles. However, one point bears repeating: female safety belt use rates have typically been closest to male behavior in pickup trucks, conversely, for 2006, the rate for females in pickup trucks is very much like their safety belt use behavior in all of the other types of vehicles.

Summary

The results of the 2006 North Dakota statewide safety belt survey are summarized for selected variables in the following table and the discussion that follows. The table contains the raw frequencies and the weighted percent belted for the value of each variable. The weighted percents are adjusted to account for sampling probabilities and estimates of vehicle miles traveled for the counties and the sites that are included in this survey.

Table 7

Unweighted Frequencies and Percent Belted for Selected Variables, 2006			
Variable	**Value**	**Unweighted Frequency**	**Percent Belted**
Occupant	Drivers	20,850	78.4%
	Passengers	3,122	83.2%
	All	**23,972**	**79.0%**
Region	Northwest	4,343	70.5%
	Northeast	4,844	72.5%
	Southwest	6,433	76.2%
	Southeast	8,352	83.5%
	All	**23,972**	**79.0%**
Population	Urban	13,354	76.8%
	Rural	10,618	82.6%
	All	**23,972**	**79.0%**
Roadway	State	7,370	72.5%
	Federal	8,507	75.8%
	Interstate	8,095	85.0%
	All	**23,972**	**79.0%**
Vehicle	Auto	11,214	81.7%
	Van	2,678	87.6%
	SUV	3,938	81.8%
	Pickup	6,142	67.4%
	All	**23,972**	**79.0%**
Gender	Male	13,894	73.4%
	Female	10,073	86.6%
	All	**23,967**	**79.0%**

- The 2006 safety belt utilization rate of 79.0% represents a moderate increase of 2.7 percentage points over the 2005 rate. This is part of the steady increase in safety belt use in North Dakota, with an average increase of 3 to

4 percentage points between 1999 and 2006. The overall rate is largely dependent on the behavior of drivers who outnumber passengers by more than six to one in the 2006 survey.

- Safety belt use increased over the 2005 rates for all four of the regions of the state, with the highest increases in the northern quadrants of the state. However, the Southeast quadrant continued to have the highest rate of safety belt use, which is significant because the highest number of observations also come from the Southeast.
- Safety belt use increased over the 2005 rates for both urban and rural sites. However, as is typical, the rate is higher in 2006 for rural sites than for urban sites.
- Safety belt use on interstate roadways is considerably higher than the rates for federal roadways, with the lowest rates for state-maintained roadways.
- Safety belt use rates are highest for occupants of vans and SUVs, with a slightly lower rate for occupants of automobiles. While the rate is much lower for occupants of pickup trucks, the use rate increased by more than five percent over the rate in 2005.
- Female vehicle occupants are much more likely to be observed wearing safety belts in 2006. This result is typical of safety belt use surveys in North Dakota.